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curbside collection of recyclables







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CURBSIDE COLLECTION  
OF  
RECYCLABLES

Project 27-89

URBAN M.  
GOVERNMENT DOCUMENTS

Prepared For  
The Regional Municipality of Hamilton-Wentworth  
Department of Engineering  
By  
WCI WASTE CONVERSION INC.

August, 1989

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## 1.0 - EXECUTIVE SUMMARY

In conducting this review and evaluation of curbside recyclables collection systems, it is significant to note that there is no firm consensus in North America regarding preferred collection vehicles or strategies. Although the majority of established recycling programs employ specially fabricated collection vehicles, a number of recently initiated and newly developing municipal recycling programs are using alternative systems for their activities. The most appropriate strategy for Hamilton-Wentworth entails the development and application of measures that consider specific local needs and resources.

The trend in most established recycling programs is to use specialty recycling collection vehicles, such as those manufactured by LaBrie, Jaeger, and Haul-All with either one or two collection/driving staff. Flexibility in the size and number of compartments within the collection vehicle is important. Some newer recycling programs have also adopted, or are considering the use of different collection systems. These include:

- recycling materials trailer towed behind garbage trucks
- box vans or stake trucks converted for recyclables collection
- garbage packer trucks used on alternate days for recyclables collection.

More importantly, new entrants into municipal recycling are reviewing the entire Blue Box collection concept. Some other options being considered include:

- single stream curbside collection, with separation and processing of recyclables at a central facility
- colour-coded garbage bags containing different segments of the waste and recyclables stream, collected in a single operation by multi-compartment vehicles
- wet/dry waste stream segregation at households, with separate collection and processing.



A number of communities in North America are pursuing studies and pilot trials of these various strategies at costs ranging from about \$100,000 to \$1.5 million for each municipality.

This review has involved discussions with agencies such as The Ministry of the Environment, The Recycling Council of Ontario, Ontario Multi Materials Recycling Institute, several municipalities, and a number of established authorities in the field of municipal recycling. It is evident from these investigations that there are no well-defined ideal strategies for municipalities to use as guides. The considerations and issues related to municipal recycling are, and will continue to be, in a state of constant change for the foreseeable future. In particular, the stability and viability of market outlets for recyclables are becoming critical factors as the volume of recycled materials grows continuously. In 1987, 150,000 residences in Ontario were served by Blue Box programs. Today, this service has extended to 1.5 million homes in 150 communities. Warehousing of collected newsprint that cannot be reprocessed has become a regular practice. It is estimated that offshore shipment of recyclables, in 1990, will cost the Ontario government about \$1.8 million in subsidies as these materials are sold at prices below those paid to recycling agencies.

Based upon the established Blue Box program in Hamilton-Wentworth, the following findings and recommendations are summarized:

- i) Existing stake trucks used by Third Sector are cost-effective collection vehicles for high-density urban areas and neighbourhoods where compact vehicle size and maneuverability are important factors. In this application, the use of two collectors and one driver is recommended for good efficiency.
- ii) The existing stake trucks may be used effectively with one collector in suburban areas where residences are not closely spaced. Alternatively, specialty recycling collection vehicles employing a single driver/collector, or a driver/collector and a collector to assist, may be used in the noted neighbourhoods, provided that overhead utility and tree clearances will accommodate the hydraulic loading mechanisms of such vehicles.



The foregoing points assume that certain modifications noted in the March, 1989 Municipal Recycling Plan will be performed on the stake trucks, to upgrade the efficiency of collection and unloading to an acceptable level. These modifications will permit the stake trucks to provide a more attractive cost/performance ratio than the more expensive specialty vehicles in high-density urban settings. With the application of these measures, it is expected that the present stake truck fleet will provide acceptable and practical service for an additional period of approximately 3 years.

The trend towards increasing set-out rates, and greater recyclables volume will probably dictate the need for two-person vehicles in order to maintain optimum productivity for vehicles used in collection.

- iii) In rural areas with widely-spaced collection points, a tow-behind recyclables trailer attached to the regular garbage collection truck provides acceptable service at the most competitive cost. The size and configuration of the trailer must be determined on the basis of the recyclables stream characteristics for specific areas.
- iv) The use of existing garbage collection vehicles for pick-up of bagged or loose recyclables is not recommended.
- v) Towed recyclables trailers are not a feasible option in most urban areas with closely spaced collection points, or in areas having congested or restrictive routes.
- vi) An ideal recyclables collection system would combine the simultaneous pick-up of garbage and recoverables with a consolidated collection vehicle. However, there are no single unit vehicles available currently which can accommodate the efficient collection of garbage and recyclables jointly.
- vii) Expansion of the Blue Box program for apartment buildings, and commercial/industrial sectors will require the development of modified storage/collection methods, and experimentation with selected collection vehicles to establish the most efficient and practicable strategy.



It is emphasized that the Region and its municipalities must maintain the maximum possible flexibility in the operation and development of their municipal recycling programs. This is best achieved by careful evaluation and prudent control over expenditures associated with current activities and capital expenditures associated with recycling works.

Regular annual reviews of the performance and direction of its own recycling strategies are an essential component for the successful and economical execution of the Region's overall waste management program. These reviews should focus primarily on the Region's specific needs and resources, utilizing other municipalities' programs as reference sources rather than examples to be duplicated.

A current review of the Third Sector collection system and processing facilities reveals that noticeable improvements have been effected since the Municipal Recycling Plan for Hamilton-Wentworth was released in March, 1989. These improvements are reflected mainly in improved plant housekeeping and organization of activities, and better curbside collection. However, truck modifications and changes to unloading and processing operations, to further improve overall efficiency, are yet to be implemented.

This finding emphasizes the need for the Region and municipalities to establish and monitor specific performance standards for their recycling agent. In addition, the existing Third Sector operation and management must continue to make progressive improvements in order to competitively pursue significant recycling expansion in the multi-residential, commercial, and industrial sectors.

The recommendation stated in the March, 1989 Municipal Recycling Plan, that the Region and/or municipalities call for competitive proposals for agents to conduct recycling collection and processing on a contract basis, is therefore considered to be appropriate and necessary.

It is recognized that the provisions of Bill 155, as applicable to the Hamilton-Wentworth Region at the present time, may prevent the Region from operating an efficient recyclables collection program unless the unanimous agreement of all the local municipalities is provided. This is a matter that must be resolved between the Region and the municipalities to define the structure of the governing body to oversee recycling collection and processing activities. Because it is desirable to conduct



these activities through one agency if possible, the Region and municipalities should consider a co-operative and united role.

As a final and very important aspect, the continuing operation and development of recycling programs in the Region must consider seriously the issue of market outlets for recycled products. This area of attention will determine if the Regional recycling efforts and costs will result in the useful diversion of recovered materials to new uses, or if the recovered materials are directed ultimately to disposal because of inadequate markets.

While the net cost per tonne for the Region and its municipalities related to the Third Sector operation is now generally consistent and competitive with costs of comparable North American programs, future developments and objectives are expected to require the application of specific performance standards and strategic goals. These are most appropriately designated in a public request for proposals which reflects the needs and direction of the Region and its municipalities.



## 2.0 INTRODUCTION

### 2.1 General

Subsequent to the March, 1989 report prepared by WCI, "Municipal Recycling Plan For Hamilton-Wentworth", the Region commissioned WCI Waste Conversion Inc. to perform an extended evaluation of recyclables collection systems and methods.

### 2.2 Tasks

The following Terms of Reference were assigned to define the scope of work for this project:

Based on the continuation and expansion of the existing Blue Box program, determine the feasibility of using a single common vehicle, or a common vehicle in combination with an accessory unit, for regular waste collection and curbside recycling. Specifically, can the existing waste collection system be modified to handle curbside collection of recyclables?

The objectives of this project are:

- i) Identify options for collection vehicle systems. Provide a respective evaluation of these options as opposed to a detailed cost/benefit analysis. Select the preferred collection system.
- ii) For the preferred collection system, define the collection methodology including staffing and logistics which will provide the most efficient, practicable, and dependable recyclables collection.
- iii) Provide an initial basis for further decision making in refining the direction for the 4 Rs program



## 2.3 Method

The approaches applied in conducting this project include:

- i) Survey and evaluate the collection methodology for recyclables which is practised in several municipalities, by means of literature reviews, telephone interviews, site visits, and discussions with the Ministry of the Environment, Third Sector, and the Recycling Council of Ontario.
- ii) Assess the impact of recycling trends, such as wet/dry systems, on collection methodology.
- iii) Define the preferred strategy within the Region, including staffing and logistics.



### 3.0 COLLECTION VEHICLE SYSTEMS AND METHODS REVIEW

The present evaluation included consultation with a number of agencies, including:

- o Ministry of the Environment
- o Recycling Council of Ontario
- o Ontario Multi Materials Recycling Institute
- o Third Sector
- o Region of Halton
- o Region of Durham
- o Region of Peel
- o Metropolitan Toronto
- o City of Toronto
- o City of London
- o Governmental Refuse Collection and Disposal Association.

From these sources, plus discussions with Hamilton-Wentworth Region and local municipality officials, and a literature review of recycling activities in North America, a number of findings were established.

#### 3.1 Recyclables Collection Utilizing Existing Garbage Collection Personnel and/or Vehicles

The use of existing garbage collection personnel for recyclables collection in Hamilton-Wentworth is not considered to be a practical measure for the majority of collection routes. Because the municipalities in the Region provide once-a-week garbage collection, the present crews assigned to this task are not sufficient to perform recycling collection also.

Although the recycled waste stream constitutes only about 15% of the total household waste stream, recycling collection crews must cover the same routes and mileages as garbage collection crews. Also, with increasing citizen participation, recycling collection crews may expect to service approximately 75% of all residences on collection routes. The reduction in garbage collection requirements, resulting from recycling, is not sufficient to release adequate existing staff resources to perform recycling collection. As a tested and proven concept, curbside



recycling is most successful when collection is performed on the regular garbage collection day. To provide this service, garbage collection staffing would require substantial expansion in all municipalities. Alternately, regular overtime and weekend shifts would be required for garbage collection crews to collect recyclables at times other than during regular garbage collection.

The use of standard garbage compaction trucks for recyclables collection is not recommended. This system is being tried by the City of Toronto, and is reported to require significant development and improvement. Although this method utilizes existing garbage collection trucks, the recyclables must be collected on days other than those designated for refuse pick-up. The crews and vehicles are well adapted to the collection function, but serious difficulties are incurred in the processing of collected materials. Glass components are broken and contaminated beyond permissible limits for acceptance by end-users. Steel and aluminum cans are deformed and difficult to separate at the processing facility. Newsprint must be collected by another separate vehicle and crew.

In accordance with the foregoing findings, the use of present garbage collection personnel and/or vehicles is not recommended.

### 3.2 Recyclables Trailer Behind Garbage Truck

This combination is recommended for rural routes where maneuverability and overall length are not critical factors. In high density population areas, or neighbourhood routes restricted by roadway parking, dead end streets, and narrow lanes, this arrangement will not be safe or efficient. Also, in requiring garbage collection staff to pick up and load a separate stream of recyclables, the work efficiency of the refuse truck/crew combination can be seriously reduced. In medium and high-density residential areas, the expense of reduced efficiency can exceed the savings obtained by single-pass collection of recyclables with garbage, as the substantial investments in collection crews and costly packer trucks are not well utilized in the extended time needed at each stop to load recyclables separately from the regular garbage stream.



### 3.3 Specialty Vehicles

A number of vehicles designed specifically for the curbside collection of recyclables are available from various suppliers. These units range from simple manual-loading compartmented vehicles, to sophisticated hydraulically-loaded bodies. The advantages of these vehicles over the modified stake trucks used by Third Sector are related mainly to increased payload and reduced loading and unloading effort by operators. The disadvantages are significantly higher purchase and maintenance costs, and marginal or inadequate overhead clearance in urban areas with overhead utilities and roadside trees. Also, the increased payload capacity of these vehicles is based upon loading from one side only. When these vehicles are open for loading from both sides, their total payload capacity is reduced significantly. These units are not recommended to replace the present stake trucks in urban areas with a high density of single family dwellings, but they should be considered for appropriate suburban routes and for servicing neighbourhoods with attached residences.

### 3.4 Intermediate Depots

One of the significant deficiencies associated with the present recyclables collection system is time lost when travelling to and from collection routes in outlying areas that are remote from the recycling receiving/processing center. This can be addressed in three principal ways:

- i) establish intermediate depots; this will provide local drop-off points for collection vehicle unloading, thereby minimizing unproductive travel time; however the costs associated with the establishment and operation of depots, and the double-handling of materials are not considered justifiable at this time.
- ii) decentralize receiving/processing facilities: this option will also reduce unproductive travel time, but the extra costs involved in providing certain redundant services will generally exceed the potential savings.
- iii) accessory trailers; these can be towed by recycling collection vehicles servicing selected routes in remote Regional areas, and have the



potential to significantly reduce, or eliminate, unnecessary return trips to the central facility.

### 3.5 Single Stream Collection

This system employs single curbside collection of household wastes, without any source separation, delivering the waste to a central processing plant which separates recyclable materials from the general waste stream using a combination of mechanical and manual processes. In this operation, recyclables such as glass, metals, newsprint, corrugated paper, and plastics are theoretically separated at the processing plant; the remaining materials may be divided into compostable organics, a combustible fraction, and a residue for landfill. This process is reported to be available, but there are no established records of success, nor documentation about the quality of the recovered materials. The potential cost, complexity, and questionable performance of a processing system which accepts a fully mixed refuse stream are factors which do not lead to a preferred ranking for such an option. At this time, this type of system is considered dependable only in its more basic form to process energy from waste, as is done at SWARU.

### 3.6 Colour-Coded Garbage Bags

This measure requires the use of differently coloured garbage bags for different components of the household waste stream. In practice, one bag would contain commingled plastics, metals, and glass, another, newsprint (which could also be bundled without bagging), and a third would contain waste for disposal. These bags might be collected in packer vehicles with a lesser compaction rating than that used for normal garbage collection. This concept is simply an extension of the Blue Box system. The advantages include perceived convenience for householders, and somewhat easier recyclables loading. Disadvantages include increased usage of plastic bags, the possible contamination of recyclables, and a small additional cost to residents.

This concept is not recommended for application now, but it may be considered in the foreseeable future.



### 3.7 Wet/Dry Collection

There are a number of different versions available with respect to the wet/dry collection concept. In basic principle, householders segregate all "wet" waste (grass, garden and kitchen wastes) from "dry" waste (wood, paper, plastic, glass, metal, cardboard). These two segregated streams are collected by either one or two collection vehicles, on the same or different days. At a processing facility, the "wet" materials are directed to composting, and the "dry" materials are divided into their separate components. This concept is also an extension of the basic Blue Box program. It is a valid concept, although it is experimental in North America. One of the principal disadvantages of this concept relates to the presence of significant volumes of wastes that require direct disposal because they are not suitable for either recovery or composting. Also the cost and effectiveness of this strategy are yet to be determined on a large scale basis.

In the Region of Hamilton-Wentworth, institution of an aggressive household composting program has significant potential and may provide results equal to an effective wet/dry program at a fraction of the cost.

For large-scale generators of "wet" or compostable wastes, there are a number of practical in-house options which they may pursue, and there are private sector services in place locally to assist with this requirement.

Hamilton-Wentworth's proposed central composting facility for selected municipal solid waste and sewage sludge has been approved for 33% funding by the Ministry of the Environment. A key requirement for central composting is a comprehensive hazardous waste program for small generators so that the waste stream is not contaminated. Selected municipal solid waste such as yard waste, waste from multi-unit dwellings, institutions, and commercial establishments would be most appropriate assuming a backyard composting program were put in place.



#### 4.0 RECYCLING TRENDS

In North America, there has been a pronounced and growing trend towards curbside recyclables collection over the past several years. Significant increases in the number of programs implemented, and volumes of recyclables, have occurred in the past two or three years. Since 1987, the number of Ontario residences served by Blue Boxes has increased from 150,000 to 1.6 million homes.

The majority of these recycling programs employ the basic Blue Box type method of separation and collection. That is, a collection agent picks up recyclable materials which have been separated into desired components by householders. Generally the recyclables may include the following materials:

- newsprint
- glass
- metal cans
- plastic soft drink containers and/or mixed plastics.

The newsprint is usually kept apart from the other materials which are normally commingled. Separation of recycled containers may be done by the collection agent at curbside, placing specific items into separate bins in the collection truck; more often, the commingled materials are separated at a processing facility where combined mechanical/manual sorting operations are employed to separate various recyclable streams.

Overall recycling program methodologies are in a state of change and development in most municipalities. Where curbside-type recycling is performed, the Blue Box system is the one most commonly employed. However, some municipalities are considering or experimenting with various other methods such as wet/dry collection, or bulk waste collection with central plant processing and separation. The validity and efficiency of these latter two methods is yet to be determined, but at this time they may not be competitive with the Blue Box type of system unless they are modified to a point where they closely resemble the basic Blue Box concept. As a low-range projection, it is anticipated that the present basic Blue Box system may evolve to different and more efficient programs within five years.



The wet/dry system, which is gaining some acceptance in Europe, is being evaluated in North America as a potential replacement for the Blue Box system. A number of issues regarding the logistics and cost/benefit of this type of system in North America are to be resolved. A principal consideration relates to essential differences in the physical and demographic characteristics of communities in North America in comparison to those in Europe. These differences may render the wet/dry recycling concept to be unfeasible in most North American communities. In particular, it is believed that many municipalities, such as Hamilton-Wentworth, may be able to accommodate the "wet" component of a wet/dry system through direct and simple household composting programs.

The second principal evolution of residential recycling programs is the expansion of activities to apartment buildings and the commercial/industrial sectors. The successful and effective implementation of programs in these latter two areas will require the application of different storage and collection methods than those used for normal residential curbside activities. It is expected that existing Blue Box type programs may be extended to a selected range of commercial/industrial agencies, on the basis of recyclables volume generated by specific sources. For those generators producing quantities of recyclables beyond a defined limit, a separate modified collection strategy may be employed. Alternately, these latter generators may be directed to address their needs through available private sector resources apart from the municipally conducted recycling program.

The developing trend in plastics recycling is to collect all mixed plastics, fully commingled, or separated into rigid and flexible components. However, firm markets for recycled plastics are still undeveloped, and the security of uninterrupted outlets remains uncertain at this time. In Hamilton-Wentworth, there is a definite advantage provided by SWARU, where plastics can provide an excellent fuel source as part of the waste stream, when they cannot be recycled.

As more municipalities pursue recycling programs, which continue to generate growing quantities of recovered materials, the availability of market outlets is gradually diminishing in most material sectors, with the exception of metal cans. However, even this latter material may be subject to significant price fluctuations.



Based upon a review of developments in Ontario and North American recyclables marketing, a significant market trend has been noted. It is apparent that the quantities of recyclables being produced are generally exceeding the processing capacity of the facilities which have traditionally purchased these materials. As a result, large quantities of recyclables are being stockpiled in warehouses, or are being directed to landfill disposal where the cost of storage and handling will exceed the product value. Loads of low-value materials, such as glass, are being rejected by processing plants on the basis of inadequate quality, and these are being landfilled. This trend is expected to continue and grow until additional facilities for processing, and markets for the re-processed recyclables, are in place. In order for the private sector to expand processing capacity by means of larger or additional facilities, substantial capital investment will be required. Although a portion of this investment may be subsidized by government funds, the balance of expenses will be borne by the processing agencies, or joint venture partners. In some parts of North America, the funds to expand or build facilities are being generated by tipping fees charged to recyclables collectors by the processing firms. The rationale for these charges reflects the cost of establishing processing facilities, and the service being provided by the firms that accept the collected recyclables.

At the present time, some surplusses of materials collected in Ontario for recycling are being sold for offshore exports. However, the prices at which these materials are sold for export are significantly lower than those paid initially to the agencies which have collected and processed the recyclables through curbside programs. As a result, it is estimated that the Ontario government will subsidize the export of used newsprint by about \$1.8 million in 1990.

Within the next three to five years, it is likely that many municipalities and other agencies collecting recyclables may be required to pay a receiving fee to the processing agencies, in contrast to the sales revenue currently paid to recyclables collectors by the processing plants. If this practice becomes prevalent with respect to Hamilton-Wentworth recyclables, the Region and municipalities must evaluate the most appropriate and suitable recycling/waste management policy which is applicable to its own needs and resources.



## 5.0 RECOMMENDATIONS

It is recommended that:

- i) The Region and municipalities develop a well defined and detailed strategic policy for recycling, with a related request for proposals to conduct their present and expanded municipal recycling activities.
- ii) The terms of the request for proposals include provisions reflecting the current and projected needs and objectives within the Region, and the commensurate performance standards.
- iii) Third Sector be included in the request for proposals.
- iv) Stake trucks used currently by Third Sector continue to be used for collection with two loading staff in urban areas where single-pass collection of both sides of the street is practised.
- v) Modifications related to the stake truck operation, as defined in the March, 1989 Municipal Recycling Plan be implemented to obtain the best possible efficiency from these vehicles.
- vi) Stake trucks with trailers be used in urban areas outside of Hamilton; these combinations may employ one or two loading staff, depending upon the spacing of collection points, and whether or not single-pass or double-pass curbside collection is practised.
- vii) Specialty collection vehicles, employing hydraulic loading, be used with one loading person where double-pass collection is employed in neighbourhoods with unrestricted traffic access and adequate overhead clearance. Where applicable, a trailer may be added for areas beyond a defined distance from the recyclables processing facility.
- viii) Specialty collection vehicles, employing hydraulic loading, be used for multi-unit dwellings and commercial/institutional premises.
- ix) A policy and program related specifically to commercial/industrial recycling be developed and appropriate measures pursued.





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